ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

90 E I, II

අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2020
General Certificate of Education (Ord. Level) Examination, 2020

නිර්මාණකරණය, විදුලිය හා ඉලෙක්ට්‍රොනික තාක්ෂණවේදය I, II
வடிவமைப்பும் மின் இலத்திரனியல் தொழினுட்பவியலும் I, II
Design, Electrical & Electronic Technology I, II

පැය තුනයි
மூன்று மணித்தியாலம்
Three hours

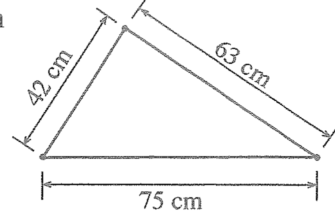
අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Design, Electrical & Electronic Technology I

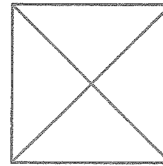
Note :
- (i) *Answer all questions.*
- (ii) *In each of the questions* **1** *to* **40**, *pick one of the alternatives* (1), (2), (3), (4) *which is correct or most appropriate.*
- (iii) ***Mark a cross* (X) *on the number corresponding to your choice in the answer sheet provided.***
- (iv) *Further instructions are given on the back of the answer sheet. Follow them carefully.*

1. When the sides of the triangle shown in figure are unfolded to form a straight line, the total length of it is



   (1) 105 cm.
   (2) 117 cm.
   (3) 138 cm.
   (4) 180 cm.

2. The diagonals of a square are joined as shown in the figure. The number of right angled triangles formed is

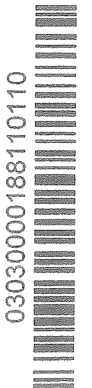


   (1) 2. (2) 4.
   (3) 6. (4) 8.

3. "The Locus of a point travelling at a uniform distance to a centre point is a circle." The most appropriate example to demonstrate this is
   (1) a tyre revolving due to push.
   (2) the revolving axis of a motor.
   (3) the path of a bull tied to a sekku.
   (4) the bucket and rope connected to the pulley of a well.

4. The internal angle of a regular polygon is 108°. What is the name of this polygon?
   (1) Regular pentagon (2) Regular hexagon
   (3) Regular heptagon (4) Regular octagon

5. What is the initial stage of designing?
   (1) Collection of specifications (2) Identification of the problem
   (3) Analysis of the problem (4) Submission of design summary



[see page two

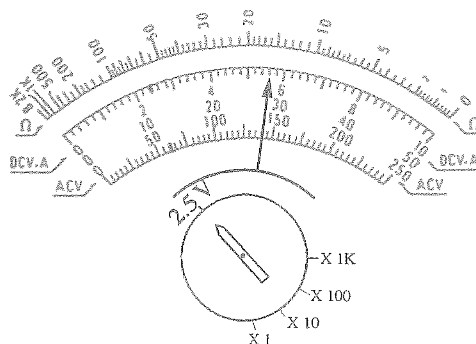
6. The statement "Uncleanness of environment due to collection of garbage in the house compound" is
   (1) analysis of problem.
   (2) identified problem.
   (3) design summary.
   (4) design specification.

7. The initial reading of the meter was noted as 13250 in a house and after a definite time period it was noted as 13460. According to the data, what is the conclusion that can be made?
   (1) 210 V were consumed for the household electronic equipments
   (2) 210 W of power were gained for the household electric equipments
   (3) 210 A of current were gained for the household electrical equipments
   (4) 210 units were used for the household electric equipments

8. What is the most appropriate tool to bend and cut a wire?
   (1) Pointed plier
   (2) Combination plier
   (3) Cutting plier
   (4) Lock plier

9. Which option includes the sequential order of fixing accessories for a consumer unit of a wired domestic electrical circuit?
   (1) Isolator, miniature circuit breaker, residual current circuit breaker
   (2) Residual current circuit breaker, Isolator, miniature circuit breaker
   (3) Isolator, residual current circuit breaker, miniature circuit breaker
   (4) Miniature circuit breaker, Isolator, residual current circuit breaker

10. Figure shows the dial of a multimeter. What is the value of the direct current voltage according to the position of the indicator?



   (1) 1.4 V
   (2) 5.6 V
   (3) 28 V
   (4) 140 V

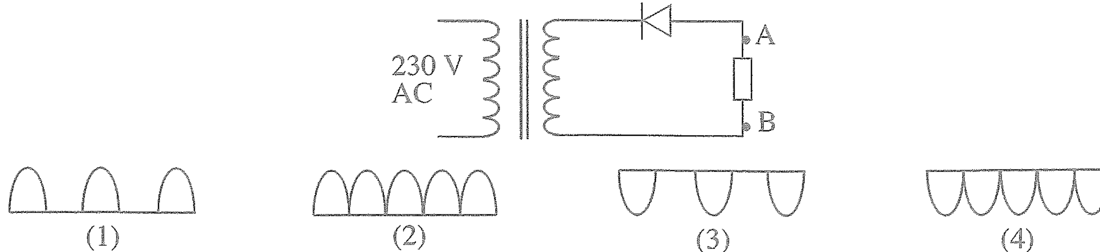
11. It is marked as 30 mA in a residual current circuit breaker. What does it mean?
   (1) The current that can flow through the residual current circuit breaker
   (2) The maximum current that flows through the body in case of electrocution
   (3) Maximum current of residual current circuit breaker windings, that can be borne
   (4) Minimum current difference via live and neutral conductors to break the circuit

12. What is the value of the resistor that should be connected in series to activate a relay of 6 V of 100 mA by a 12 V supply?
   (1) 6 Ω
   (2) 12 Ω
   (3) 18 Ω
   (4) 60 Ω

13. The value 1000 mAh marked in a chargeable cell denotes,
   (1) life time of the cell is one hour.
   (2) 1000 mA could be obtained from the cell.
   (3) A current of 1000 mA is included in the cell.
   (4) 10 mA can be obtained through the cell in 100 hours.

[see page three

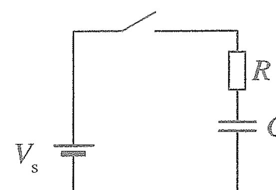
14. Select wave pattern that shows the change of voltage wave pattern between A - B of the circuit.



15. In a cable with seven conductors 7/.50 denotes that one conductor .

(1) has a diameter of 0.50 inches.
(2) has a diameter of 0.50 mm.
(3) has an area of 0.50 square inches.
(4) has an area of 0.50 square centimeter.

16. Which of the following factor/s depend on the time required to charge the capacitor through resistor shown in the circuit?



(1) Supply voltage value
(2) Resistance value and capacitance
(3) Supply voltage and capacitor value
(4) Supply voltage and resistance value

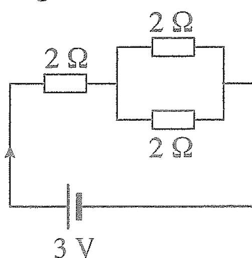
17. What is the value of a capacitor marked as 104?

(1) 0.1 μF (2) 104 μF (3) 10.4 pF (4) 104 pF

18. Which figure shows the most successful method of soldering the end of a resistor to a printed circuit?

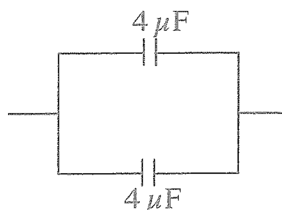


19. What is the current flowing through the circuit shown in the figure?



(1) 0.05 A (2) 0.1 A (3) 0.5 A (4) 1 A

20. What is the value of the single circuit that can be used instead of two capacitors shown in the figure below?



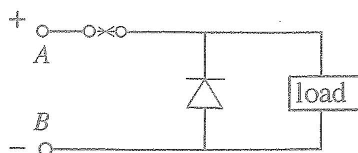
(1) 2 μF (2) 4 μF (3) 8 μF (4) 16 μF

21. What is the symbol of a Zenor diode?



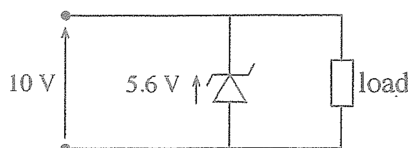
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22. Which is the true statement of the circuit shown in the figure?



(1) The load will be protected if there is a polarity change in supply
(2) The diode will bias if high current flows to the load
(3) Diode supplies a constant voltage to the load
(4) The diode will conduct if supply voltage is increased

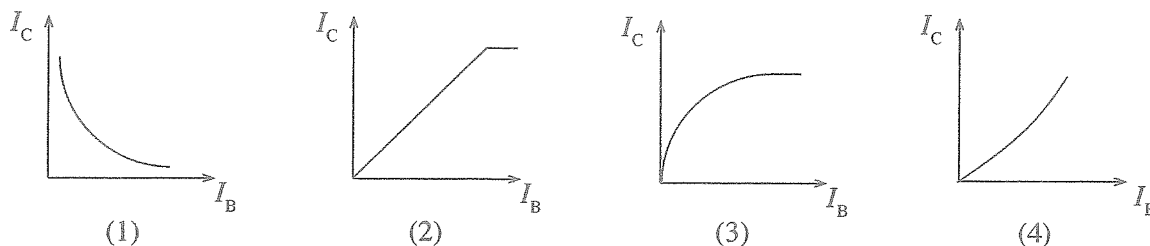
23. What is the voltage through the load shown in the figure?



(1) - 10 V (2) - 5.6 V (3) + 5.6 V (4) + 10 V

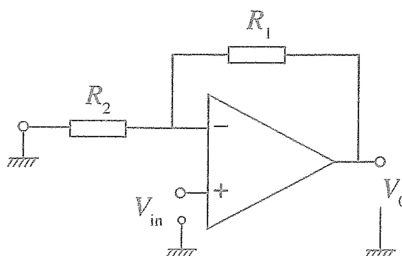
24. To activate a transistor, which method of bias to its two junctions is required?
(1) Base-emitter junction and Base-collector junction pre biased
(2) Base-emitter junction and Base-collector junction post biased
(3) Base-emitter junction post biased and Base-collector junction pre biased
(4) Base-emitter junction pre biased and base-collector junction post biased

25. What is the mutual characteristic curve of a transistor?



26. What is the reason for using a current amplifier as the last stage in a power amplifier with several stages?
(1) Current cannot be amplified through voltage amplifiers
(2) High efficiency can be reached by current amplification
(3) Voltage or current can be amplified for power amplification
(4) When power is amplified through voltage amplifiers, current amplifiers are further required for power amplification

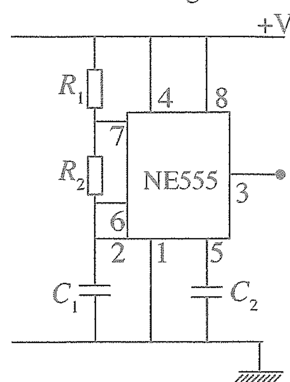
27. Consider the following circuit.



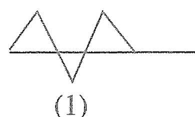
The above figure shows,
(1) non inverted amplifier. (2) inverted amplifier.
(3) voltage comparator. (4) filter circuit.

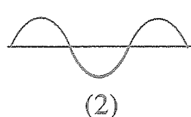
[see page five

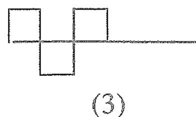
- Answer questions **28** and **29** referring to following figure.

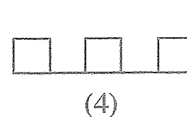


28. Select the wave form which demonstrates the output waveform of the circuit.


(1)


(2)


(3)


(4)

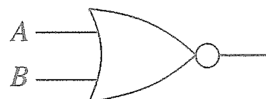
29. What is the accessory which has **no** effect on output wave frequency?

(1) R_1 (2) C_2 (3) R_2 (4) C_1

30. What is the decimal number value of 10010 which is a binary number?

(1) 6 (2) 9 (3) 18 (4) 20

31. What is the truth table that matches the gate shown in the figure?



(1)

A	*B*	*Z*
0	0	1
0	1	0
1	0	0
1	1	0

(2)

A	*B*	*Z*
0	0	0
0	1	1
1	0	1
1	1	1

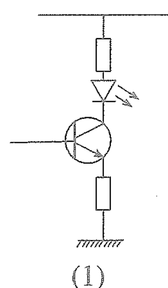
(3)

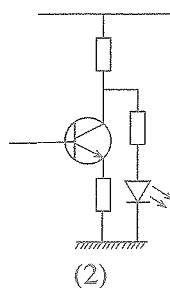
A	*B*	*Z*
0	0	0
0	1	1
1	0	1
1	1	0

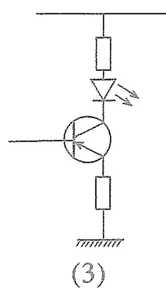
(4)

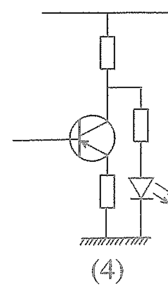
A	*B*	*Z*
0	0	1
0	1	1
1	0	1
1	1	0

32. Which is the most appropriate circuit to observe the output of a binary logic circuit?

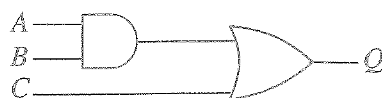

(1)


(2)


(3)


(4)

33. Select the expression which matches the output of gate circuit shown in the figure.

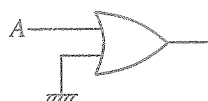


(1) $Q = (A + B) + C$ (2) $(Q = A \cdot B) + C$

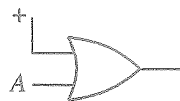
(3) $Q = (A + B) \cdot C$ (4) $Q = (A \cdot B) \cdot C$

[see page six

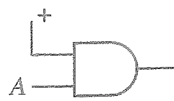
34. Which is the circuit that gives the relationship $A + 0 = A$?



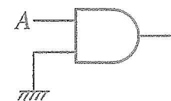
(1)



(2)



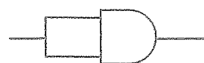
(3)



(4)

35. Which is the **non**-inverted gate arrangement?


(1)

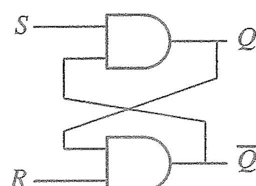

(2)


(3)

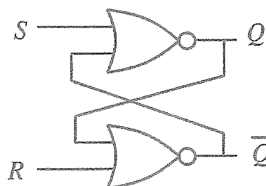

(4)

36. What is the reason for binary numbers to become disadvantaged in practical use?
   (1) Place value being powers of 2
   (2) Satisfying two voltages to denote any value
   (3) Have to use several digits to express a value
   (4) Most incidents that occur or caused to occur in the environment includes two alternate incidents

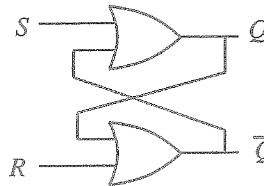
37. Which is the circuit that can be used as a $S - R$ flip-flop?



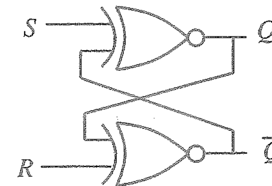
(1)



(2)



(3)

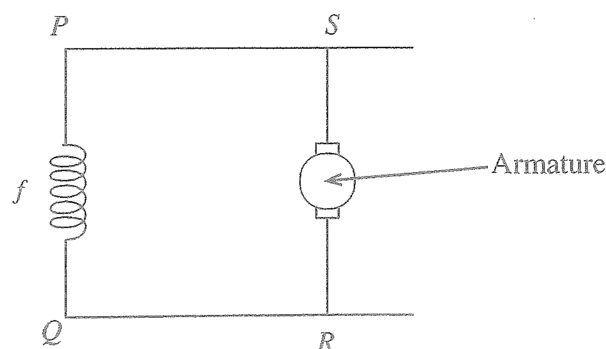


(4)

38. Several types of electro-magnetic waves separated as per frequency ranges are shown below.
   A – Infra Red rays
   B – Ultra violet rays
   C – Gamma rays

   Out of above which wave/s is/are used for remote controls?
   (1) Only A (2) Only B (3) Only A and B (4) Only A and C

39. Following shows a circuit diagram of a Motor Type.
   Here f is field coils and following methods were taken in order to change rotational direction of the mortor.



   A – change P, Q and connect
   B – change Q, S and connect
   C – change S, R and connect
   D – change P, R and connect

   By following which of the above methods how does the rotation direction of the motor change?
   (1) A and B only (2) A and C only
   (3) B and C only (4) C and D only

40. What is the level of NVQ which could be obtained from the University of Vocational Technology (UNIVOTEC)?
   (1) 4 (2) 5 (3) 6 (4) 7

[see page seven

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

90 E I, II

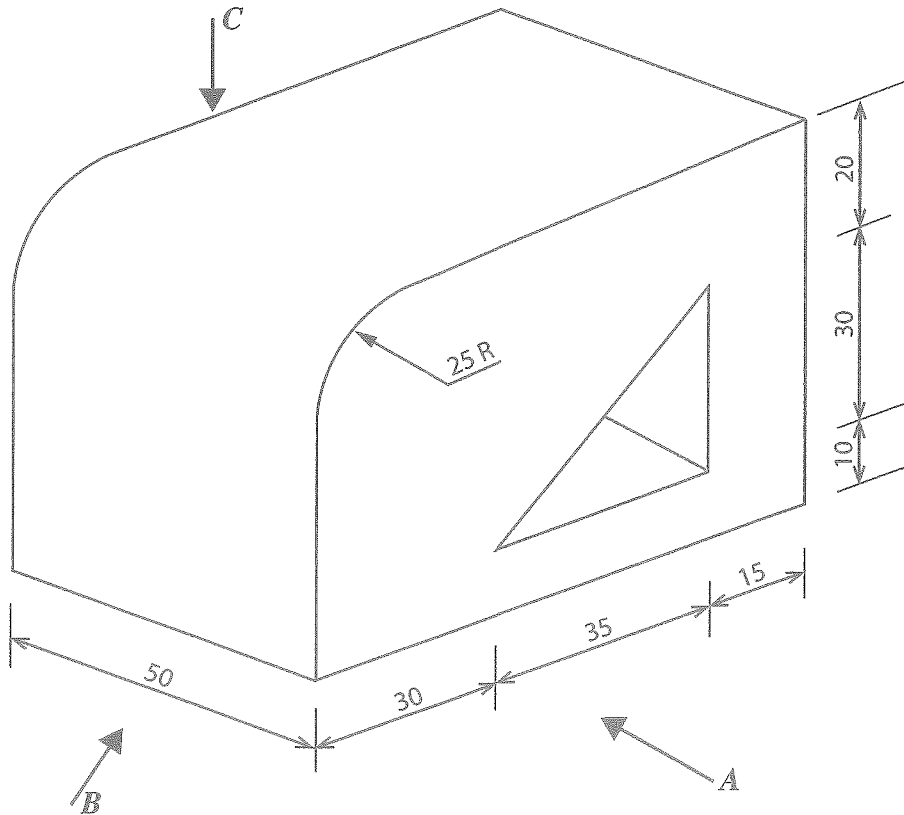
අධ්‍යයන පොදු සහතික පත්‍ර (සාමාන්‍ය පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (சாதாரண தர)ப் பரீட்சை, 2020
General Certificate of Education (Ord. Level) Examination, 2020

නිර්මාණකරණය, විදුලිය හා ඉලෙක්ට්‍රොනික තාක්ෂණවේදය I, II
வடிவமைப்பும் மின் இலத்திரனியல் தொழினுட்பவியலும் I, II
Design, Electrical & Electronic Technology I, II

Design, Electrical & Electronic Technology II

* *Answer five questions only, selecting the first question and four others.*
* *Question No.1 carries 20 marks and other questions carry 10 marks each.*

1. (i) Isometric view of an object is shown in the figure.



(All dimensions in millimetres)

According to the isometric figure given above, draw
Front, elevation seen through direction of arrow *A*,
Side, elevation seen through direction of arrow *B*,
Plan, seen through direction of arrow *C*,
using third angle orthographic projection principles to a scale of 1:1 as per the dimensions.

(ii) Draw a circle of radius 30 mm and divide the circumference into five equal parts. Construction lines should be clearly shown.

[see page eight

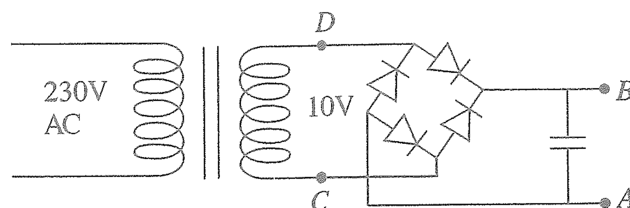
2. (i) Draw using standard symbols, the wiring circuit of a domestic electrical power circuit with two electrical lamps and one 13 A socket outlet. Connect the relevant miniature circuit breakers with their rated values.

(ii) What is the reason for connecting a miniature circuit breaker for a household circuit?

(iii) What is the reason for connecting an earth electroder to a socket outlet?

(iv) State **two** safety precautions you would take in providing an extension or repair to an existing live domestic electrical power circuit.

3. The reading of an AC voltmeter connected between *C* and *D* of the circuit shown below was 10 V.



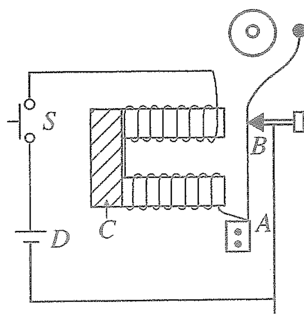
(i) What will be the reading of a DC voltmeter connected to *A* and *B* in to the circuit?

(ii) What will happen to the value of voltage if the capacitor is removed? Give the reason.

(iii) If capacitors are removed when one diode is fused, draw the voltage wave pattern between *A* and *B*.

(iv) Find the value of the resistor that should be connected in series in order to connect two LEDs of 3 V using 20 mA between *A* and *B* in series.

4. Figure shows the circuit of an electric bell.



(i) Describe the mechanism of ringing the bell.

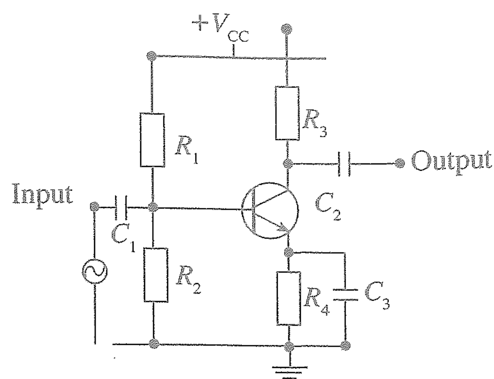
(ii) Is the winding shown in the figure correct or wrong? if wrong, draw it correctly.

(iii) When the metal sheet *C* is removed the bell sound will get weak. What is the reason for this?

(iv) What is the location in the circuit where a spark could occur?

[see page nine

5. Figure shows an amplifier circuit with a transistor.



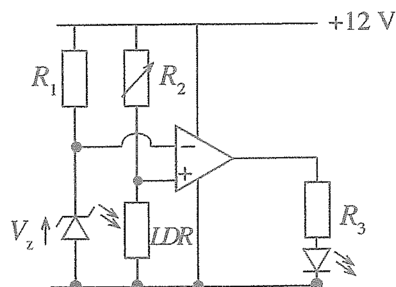
(i) Name how the transistor is biased.

(ii) Draw the wave form of the output when a sinusoidal wave input from a signal generator is given, to the input. (Drawing the input wave form is compulsory)

(iii) Explain the function of C_1 and C_2 shown in the circuit diagram.

(iv) If the current gain of the transistor is 100 and the collective current is 10 mA, calculate the base current.

6. A circuit diagram to improve the sensitivity of a light sensitive resistor is shown below.



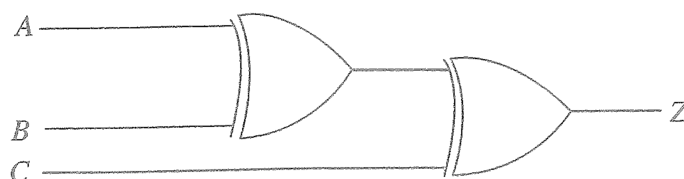
(i) What is the role of the operational amplifier in above circuit?

(ii) What is the reason for using a variable resistance at R_2 shown in the above circuit?

(iii) Does the LED connected to output light up when LDR is exposed to light or in the dark? Explain.

(iv) Draw how a transistor is connected to activate a relay through the output of operational amplifier.

7. A logic gate circuit with three inputs is shown below.



(i) What is the gate used in above circuit?

(ii) Draw the truth table for one gate of the circuit.

(iii) Draw the truth table for the complete circuit in the above diagram.

(iv) Using the truth table drawn for complete circuit describe briefly how the gate circuits could be used to control an electric lamp from three locations.

* * *



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